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Microarthropod community structure in a coastal dune ecosystem on Jekyll Island, Georgia U.S.A.

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With 3 figures

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1. Introduction

Soil microarthropods from coastal dune systems have been poorly characterized. These organisms play critical roles in soil formation, stabilization and nutrient cycling processes in other ecosystems (Kubiena 1955, Kevan 1962, Crossley 1977 and Lebrun 1979). Soil processes are particularly important in coastal dunes where establishment and persistence of vegetation determines growth and stabilization of the dunes themselves (Boorman 1977). In coastal dunes, as in deserts, vegetation ameliorates microclimate extremes. Temperature, water, nutrient, and organic matter relations in dune soils depend on vegetation, which in turn depends on the age and physico-chemical parameters of the dune system (Martin 1959, Ranwell 1972, Boorman 1977).

The importance of coastal dunes in recreation, coastline protection, coastal ecology, education, aesthetics and property value has been established (Sandifer *et al.* 1980, Anonymous 1975). Coastal dunes are subject to a variety of anthropogenic impacts, and management for minimalization of such impacts is costly and complex (Ranwell 1972, Anonymous 1975). The role of microarthropods in soil processes, particularly in relation to plant life, may therefore have far-reaching consequences. Microarthropods accelerate decomposition and nutrient cycling processes (Witkamp & Crossley 1966). Ingestion of organic debris by microarthropods fragments litter, increasing surface area available to microbial decomposers thus enhancing degradation of complex organic molecules (Douce & Crossley 1977, Crossley 1970). Microarthropods may also enhance fungal metabolism by grazing and spore inoculation, thus indirectly increasing decomposition rates (Madge 1965, Witkamp & Crossley 1966, Crossley 1977). Organic decomposition and nutrient cycling may proceed up to five times faster in the presence of microarthropods (Lebrun 1979). Dune soils are coarse-grained, and require accumulated organic matter to increase nutrient content at field capacity (Boorman 1977). Stabilization of dunes depends on vegetative succession, which in turn depends on soil formation and fertility (Boorman 1977). Soil fertility cannot be dissociated from diversity of trophic relationships of the microarthropod fauna (Lebrun 1979).

Very little information is available about the ecology of coastal dune microarthropods and community integration in dune soils. We report here on a study of soil microarthropod community structure in a coastal dune habitat as a first step toward understanding soil subsystem processes of coastal dune ecosystems.

2. Study site

Field work was conducted on Jekyll Island, Georgia (Fig. 1). Jekyll Island encompasses 2307 hectares of land, 567 ha of which are *Spartina* salt marsh, and 1,497 ha of which are developed. Jekyll Island has a core of pleistocene sediments, with a beach ridge of Holocene origin (Zeigler 1959). Elevations on the island range from sea level to 10.7 meters. High land acreage supports a remnant maritime forest of live oak *(Quercus virginiana)*, cabbage palmetto *(Sabal palmetto)*, saw palmetto, *(Serenoa repens)*, southern red cedars *(Juniperus silicicola)*, wax myrtle *(Myrica cerifera)*, and slash pine *(Pinus elliottii)*. This forest has been substantially modified by development.

The climate of the Georgia coastal region is mild with short winters and warm humid summers. At Brunswick, Georgia, mean summer high of 32.9 °C occurs in July, and mean winter low of 7.2 °C occurs in January. Climatic summaries are found in Carter (1967) and Mathews *et al.* (1980).

The specific sample site was located in the transition shrub community, an ecotonal area between the beachfront foredunes and the remnant maritime forest (Bozeman 1975). This site was selected

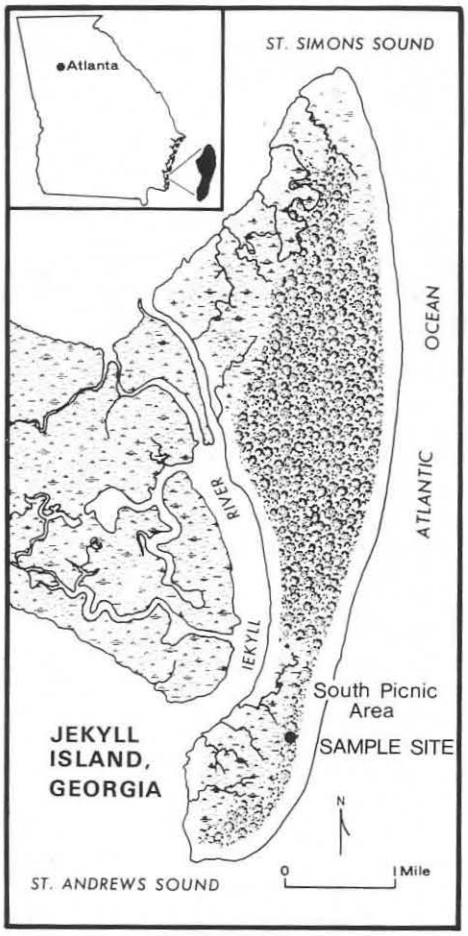

Fig. 1. Maps of Jekyll Island. **A.** Location of Jekyll Island in relation to the state of Georgia. **B.** Map of Jekyll Island, showing the location of the study site.

because of the presence of large numbers of the pest chigger *Eutrombicula splendens* Ewing which we are studying as part of ongoing research on the ecology of trombiculid mites. Vegetation at the sample site consists of wax myrtle, Yaupon holly *(Ilex vomiteria)*, saw palmetto, buckthorn (*Bumelia* sp.), live oak and water oak *(Quercus nigra)*. The soil is sandy, with a well developed organic layer at 20 cm depth. Soil is overlain by a layer of dried and decaying water oak leaves approximately 2 cm deep. Soil moisture ranged from 5.6 to 18.2%, with no significant variation among the sample dates ($p < 0.05$).

3. Methods and materials

Samples, in the form of soil cores, 5.08 cm in diameter and 5.08 cm deep were taken from an area of two square meters under a single live oak growing in a wax myrtle thicket. Five samples were taken on 26 July 1981 ("Summer 81"), five on 13 December 1981 and six on 23 January 1982 (pooled as "winter" samples), and twelve samples on 12 June 1982 ("Summer 82"). Samples were placed in a high gradient tullgren extractor for seven days (Merchant & Crossley 1970). Microarthropods were collected directly into vials of 90% ethyl alcohol, 10% glycerol. Acarina and Collembola were identified to the lowest possible taxon, usually to genus. Other arthropods were identified to order or family.

Population density (mean number of individuals per m^2), relative densities (percent of total microarthropod fauna, and percent of respective fauna) and frequency of recovery (percent of cores from which recovered) were calculated for each sample period for all genera of Acarina and Collembola comprising greater than 1% of the total microarthropod fauna during any sample period. Remaining genera (those comprising less than 1% of total fauna) were combined in Table 3 as "Miscellaneous" for each respective group. Microarthropods other than Acarina and Collembola were treated separately as "miscellaneus arthropods". "Dominant" genera are defined as those comprising more than 10% of total microarthropod population density.

Acarina and Collembola genera were classified into functional groups according to their role in soil ecosystem processes. "Detritivores" consist of genera which derive nutrition primarily from dead and decaying plant material or other decaying organic material. This group incorporates "panphytophages" and "coprophages" of Luxton (1972). "Grazers" are selective feeders which consume fungi, bacteria and algae. This group incorporates "microphytophages" of Luxton (1972) and Behan & Hill (1978). "Predators" are mites which feed primarily upon other soil arthropods or nematodes. Microarthropods classified as "unknown/no role" encompass taxa whose feeding habits are unknown or which are only incidental inhabitants of the soil subsystem. All statistical analyses were conducted by nonparametric one-way analysis of variance (Zar 1974).

4. Results

4.1. Survey of microarthropod fauna

We recovered 6,398 microarthropods representing 120 genera in 80 families of mites and Collembola (Table 1). Mites comprised between 86 and 94% of the total fauna on all sample dates. Collembola comprised 4 to 7% of total fauna, with the remainder partitioned among miscellaneous taxa (Fig. 2, Table 2).

There was a trend in the major groups for population densities to be reduced over the three sample periods (Fig. 2). The greatest proportional reduction occurred in Collembola (55%). Acarina over the same period showed a 45% drop in population density. This trend, though consistent, was not statistically significant ($p > .10$).

Table 1. Number of genera and families of microarthropods from sand dune litter collected off Jekyll Island, Georgia

Major Taxon	Genera			Total Genera	Total Families
	S_1	W	S_2		
Cryptostigmata	30	35	20	49	36
Prostigmata	31	24	23	35	25
Mesostigmata	14	9	10	20	11
Astigmata	1	2	3	3	2
Acarina	76	70	56	107	74
Collembola	11	10	9	13	6

Abbreviations: S_1 = Summer 81, W = Winter, S_2 = Summer 82

Table 2. Miscellaneous arthropods extracted from sand dune soil and litter under a water oak *(Quercus nigra)* off Jekyll Island, Georgia

Group	$\bar{x}$ m^{-2}			Frequency		
	S_1	W	S_2	S_1	W	S_2
Formicidae	98.7	315.8	162.8	.20	.20	.20
Misc. Hymenoptera	0	0	40.9	0	0	. 1
Thysanoptera	394.3	404.6	3,577.1	.40	.40	.70
Homoptera Larvae	2,368.3	448.9	123.4	.60	.10	.20
Coleoptera Larvae	1,282.8	493.4	330.6	.40	.60	.40
Coleoptera Adult	197.4	0	41.0	.40	0	.10
Lepidoptera Larvae	98.7	0	0	.20	0	0
Japyx sp.	690.7	44.9	616.7	.20	.10	.50
Polyxenus sp.	296.0	0	123.3	.40	0	.30
Julid Diplopoda	0	44.9	0	0	.10	0
Pseudoscorpiones	493.4	44.9	0	.60	.10	0
Araneae	1,085.5	44.9	83.9	.40	.10	.20
Scolopendromorpha	197.4	0	0	.20	0	0
Isopoda	98.7	0	0	.20	0	0
Pauropoda	2,466.9	626.6	409.5	.20	.60	.50
Psocoptera	2,565.6	44.9	0	.80	.10	0

Abbreviations: S_1 = Summer 81, W = Winter, S_2 = Summer 82

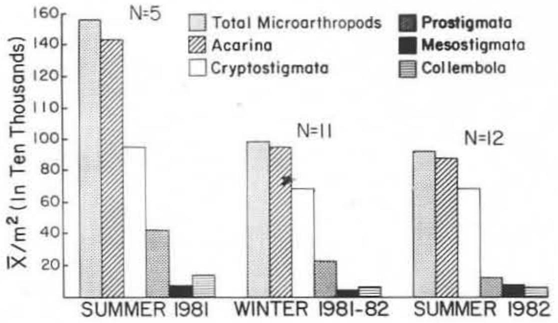

Fig. 2. Mean number of soil microarthropods per square meter collected from the secondary sand dune on Jekyll Island, Georgia.

The total number of acarine genera ranged from 54 to 71. Total genera for the major suborders of mites were as follows: Cryptostigmata — 49 genera, Prostigmata — 38 genera, Mesostigmata — 14 genera and Astigmata — 3 genera (Table 1). Cryptostigmata and Prostigmata were the dominant groups on all sample dates, with densities of 60—74% and 12—27% of all individual microarthropods recovered respectively (Figure 2). Mesostigmata comprised 4 to 7% of all microarthropods, and Astigmata comprised less than 1% of the total. Collembola ranged from less than 1% to 8% of individual microarthropods.

Table 3 shows Cryptostigmata were dominated by *Peloribates*, *Licneremaeus* and *Oppiella*. *Oppiella* and *Peloribates* also dominated the total microarthropod fauna. *Oppiella* occurred in 90% of samples in which it dominated. Immature Cryptostigmata occurred in 80 to 100% of the samples and dominated the Cryptostigmata and total microarthropod fauna in winter and summer 82.

Tarsonemidae Gen. spp. were the dominant Prostigmata on all sample dates but were the dominant group in total microarthropod fauna only in summer 1981. Eupodidae spp. *(Eupodes, Cocceupodes, Claveupodes)* were dominant in the Prostigmata in winter samples, and Eupodidae and Rhagidiidae spp. *(Rhagidia, Coccorhagidia)* were the dominant Prostigmata in summer 1982. No Prostigmata other than the Tarsonemidae were dominant in the total microarthropod fauna.

Mesostigmata were dominated by *Hypoaspis*, *Rhodacarus* and Uropodidae spp. in all samples, on all dates. No Mesostigmata dominated in total fauna.

The Collembola fauna was dominated by the genus *Lepidocyrtus* on all sample dates. *Brachystomella* and *Isotoma* dominated in summer 1981 and summer 1982 respectively. No Collembola dominated in total fauna.

Miscellaneous arthropod data are shown in Table 2. Seven of the 16 total miscellaneous arthropod groups were collected in more than 50% of the samples on any one sample date. Thysanoptera, Homoptera, Coleoptera larvae and Pauropoda were the only miscellaneous taxa to reach population densities greater than 100 individuals per meter square on all sample dates.

4.2. Functional trophic groups

Analysis of the functional groups is presented in Figure 3. There were no significant differences ($p > .10$) in any category between sample dates. Grazers made up 54 to 78% of all microarthropods recovered. This trophic group comprised the largest proportion of microarthropods primarily due to the numerous oribatid mites that were collected, which are predominately fungivorous (Evans *et al.* 1961). Other microarthropods, specifically the Tarsonemidae and Collembola, also contributed to this large trophic group component.

Detritivores comprised from 10 to 25% of all microarthropods collected. Many oribatid families collected from the dunes contain genera that are detritivores. The Carabodidae (*Carabodes* sp.), Ceratozetidae (*Ceratozetes* sp., *Trichoribates* sp.), Galumnidae (*Holokalumna coloradensis*, *Acrogalumna* sp., *Pergalumna curva*), Haplozetidae (*Peloribates* spp., *Rostrozetes* sp., *Xylobates* sp.), Nanhermanniidae (*Masthermannia* sp.), Nothridae (*Nothrus terminalis carolinae)*, Oribatulidae (*Scheloribates* sp., *Dometorina* sp., *Zygoribatula* sp., *Oribatula* sp.) and Phthiracaridae (*Hoplophorella variana*, *H. cucullata)* are all reported to be detritivores (Luxton 1972).

Predators ranged from 12 to 26% of total individuals. Most of the soil Mesostigmata are reported to be predatory (Karg 1961). of the three genera which dominated the mesostigmata, two are known to be predatory: *Hypoaspis* sp. and *Rhodacarus* sp., while the Uropodidae spp. are grazers. Nine of the 11 genera which dominated the Prostigmata (Table 3) are also reported to be predatory (*Neotydeus*, *Neocunaxoides*, *Cunaxa*, *Fessonia*, Eupodidae Gen. spp., Rhagidiidae spp.). A complete listing of the genera of soil microarthropods collected from the dune site is in the Appendix.

5. Discussion

Population densities of total microarthropods and Acarina at the Jekyll Island dune site are comparable to those reported for deciduous forests (Evans *et al.* 1961) and temperate grassland (Mallow, in prep.). The Jekyll Island dunes had greater population densities of microarthropods than either shaded desert (Wallwork 1972) or saltmarsh habitats (Luxton 1967).

We recovered 106 genera of mites from the Jekyll Island dune soil. Wallwork (1972) reported 17 genera for desert soils, and Luxton (1967) found 32 genera of mites in saltmarsh soil. Norton & Dindal (1976) recovered 15 genera from litter on a Lake Ontario shoreline.

Cryptostigmata commonly inhabit humus, litter and organic soil strata (Butcher *et al.* 1971). The Jekyll Island dune site had a higher diversity of Cryptostigmata than either Joshua Tree desert litter (Wallwork 1972), saltmarsh soil (Luxton 1967) or temperate grassland (Mallow in prep.). Apparently, salinity, *p*H, inundation and vegetative cover does not effect Cryptostigmata populations as much as pore space and organic matter distribution (Loots & Ryke 1967). The large number of genera of Cryptostigmata in the dune soil suggests that interactive or site selective resource partitioning may occur. Such partitioning has been reported for Cryptostigmata communities inhabiting deciduous forests (Moritz 1963).

Prostigmata in soils are predacious, fungivorous, phytophagous and saprophagous. Of the major prostigmata genera inhabiting the Jekyll Island dune site, the Tarsonemidae Gen.

Table 3. Major genera of Acarina and Collembola extracted from soil and litter under a water oak *(Quercus nigra)* off Jekyll Island, Georgia sand dune

Group	$\bar{x}$ m^{-2}			% Fauna Respective			% Microarthropod Fauna			Frequency		
	S_1	W	S_2	S_1	W	S_2	S_1	W	S_2	S_1	W	S_2
Cryptostigmata												
Oppiella sp.	7,598.2	15,744.0	27,590.3	7.9	21.6	39.5	4.4	14.5	27.8	.60	.90	.90
Imm. Oribatids	7,499.4	16,193.0	16,612.4	7.8	22.3	23.8	4.4	14.9	16.7	.80	.90	1.0
Peloribates sp.	13,025.5	15,117.4	6,044.0	13.6	20.8	8.6	7.6	14.9	6.1	.20	.90	.92
Liceneremaeus sp.	10,657.2	2,106.8	2,072.8	11.1	2.9	3.0	6.2	2.0	2.1	.60	.70	.60
Peloribates floridensis	6,611.4	360.2	0	6.9	0.5	0.0	3.9	0.3	0.0	.40	.36	0
Sphaerochthonius sp.	5,131.2	4,262.9	1,850.2	5.4	5.9	2.6	3.0	3.9	1.9	.60	.73	.50
Scheloribates sp.	5,328.6	2,195.6	4,647.7	5.6	3.0	6.7	3.1	2.1	4.7	.20	.64	.70
Pergalumna sp.	4,539.7	2,333.7	3,784.3	4.7	3.2	5.4	2.7	2.2	3.8	.40	.82	1.0
Cosmochthonius sp.	4,440.4	88.81	0	4.6	0.1	0.0	2.6	0.1	0.0	.60	.09	0
Allodamaeus sp.	4,144.5	448.9	616.7	4.3	0.6	0.8	2.4	0.4	0.6	.60	.64	.30
Damaeus sp.	2,466.8	942.4	330.6	2.6	1.3	4.7	1.4	0.9	0.3	.20	.73	.40
Acrogalumna sp.	1,776.2	0	0	1.9	0.0	0.0	1.0	0.0	0.0	.60	0	0
Rostrozetes sp.	98.68	404.6	986.8	0.1	0.6	1.4	0.1	0.4	1.0	.20	.30	.80
Oppia minus	0	4,529.3	330.6	0.0	6.2	.47	0.0	4.2	0.3	0	.64	.30
Suctobelbella sp.	0	0	1,149.6	0.0	0.0	1.6	0.0	0.0	1.2	0	0	.40
Berlesezetes sp.	0	582.2	1,396.3	0.0	0.8	2.0	0.0	0.5	1.4	0	.55	.50
Misc. Cryptostigmata[1])	25,064.2	7,465.3	2,467.2	25.5	10.3	3.5	14.7	7.0	2.5	—	—	—
Prostigmata												
Tarsonemidae Gen. sp.	17,860.7	9,912.2	1,726.9	41.0	37.5	15.6	10.4	9.1	1.7	.20	.90	.60
Eustigmaeus sp.	3,552.4	360.2	40.95	8.2	1.4	0.4	2.0	0.3	<0.1	.40	.40	.10
Neotydeus sp.	2,762.9	898.0	493.4	6.3	3.4	4.4	1.6	0.8	0.5	.40	.30	.30
Neocunaxoides sp.	2,368.3	715.4	1,233.5	5.4	2.7	11.1	1.4	0.7	1.3	.40	.50	.80
Cunaxa sp.	2,269.6	582.2	286.2	5.2	2.2	2.6	1.3	0.5	0.3	.60	.50	.30
Fessonia sp.	3,157.7	177.6	123.4	7.3	0.7	1.1	1.8	0.2	0.1	.80	.10	.30
*Eupodidae Gen. sp.	1,578.8	7,356.4	3,083.7	3.6	27.8	27.8	0.9	6.8	3.3	.60	.90	.80
**Rhagidiidae Gen. spp.	986.8	222.0	1,356.8	2.3	0.8	12.2	0.6	0.2	1.4	.80	.30	.60
Misc. Prostigmata[1])	8,979.8	6,221.1	2,756.2	20.6	23.5	24.8	5.2	5.8	2.8	—	—	—
Mesostigmata												
Hypoaspis sp.	2,170.9	809.2	2,427.5	31.9	21.9	35.7	1.2	0.8	2.6	.60	.70	.80
Rhodacarus sp.	789.4	1,120.0	986.8	11.6	30.3	14.5	0.4	1.0	1.1	.80	.50	60
Uropodidae Gen. sp.	1,184.1	897.9	986.8	17.4	24.3	14.5	0.7	0.8	1.1	.60	.60	.60
Misc. Mesostigmata[1]	2,663.6	873.0	2,407.9	39.1	23.6	35.4	1.6	0.8	2.4	—	—	—

Collembola												
Brachystomella sp.	7,499.5	133.2	370.0	59.4	2.9	6.5	4.3	0.1	0.4	.80	.30	.40
Lepidocyrtus sp.	3,651.0	1,884.7	2,753.1	28.9	41.1	48.5	2.1	1.8	2.9	.60	.70	.70
Isotoma sp.	296.0	222.0	1,110.1	2.3	4.8	19.6	0.2	0.2	1.2	.20	.20	.70
Misc. Collembola[1]	1,183.5	2,348.0	1,440.8	9.4	51.2	25.4	6.9	2.2	1.4	—	—	—

Abbreviations: S_1 = Summer 81, W = Winter, S_2 = Summer 82.
**Eupodes*, *Cocceupodes*, *Claveupodes* spp. Together
***Rhagidia* sp. and *Coccorhagidia* sp. Together
[1]) Complete listing in Appendix

Table 4. Ratio of Cryptostigmata: Prostigmata in relation to soil organic matter content in different soil systems

Ratio **Cryptostigmata** Prostigmata	% O. M.	Biotope	Source
2.26	3.2	Sand dune	MALLOW *et al.*
2.75	6.8	Sand dune	MALLOW *et al.*
5.76	8.3	Sand dune	MALLOW *et al.*
0.182	2.8	Pasture soil	LOOTS & RYKE (1966)
0.333	6.3	Pasture soil	LOOTS & RYKE (1966)
1.80	79.0	Forest soil	VAN DEN BERG (1965) (as cited in LOOTS & RYKE 1967)
2.20	62.0	Forest soil	VAN DEN BERG (as cited in LOOTS & RYKE 1967)
3.10	66.0	Forest soil	VAN DEN BERG (as cited in LOOTS & RYKE 1967)

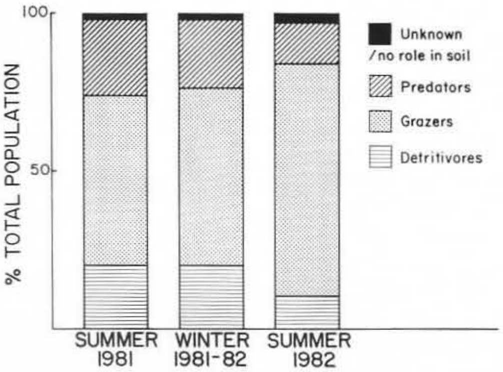

Fig. 3. Percents of the functional trophic groups for the soil microarthropods collected from the secondary sand dunes on Jekyll Island, Georgia.

spp. and *Eustigmaeus* were nonpredatory. Of these, Tarsonemidae spp. had the highest population density of Prostigmata on all sample dates. Tarsonemids tend to be patchily distributed in soils owing to their poor dispersal capabilities associated with their small size, short legs and fungivorous habits (Hughes 1962). Our data reflect this patchiness in the summer 1981 samples where the mean density of Tarsonemids were greatest, but recovery frequency was from only 20% of all samples taken. The remaining major genera of Prostigmata are predatory and are commonly encountered in other soil ecosystems. The large diversity of predatory Prostigmata may result from population density and diversity of prey available in the form of Collembola and other mites, particularly immature Cryptostigmata.

Mites in the suborder Mesostigmata are adapted to a wide range of soil habitats, and as a group they tend to flourish in moist organic soils (Wallwork 1982). The relatively low number of mesostigmatid mites at the Jekyll Island dune site may be attributed to a competitive exclusion effect caused by the large number of predatory prostigmatid mites present.

The Collembola, of which three major genera in three families were collected, are primarily detritivorous. Collembola are ubiquitous inhabitants of soil systems (Lebrun 1979). The Collembola density and diversity are higher in the sand dune soil than was reported by Wallwork (1972) for the Joshua Tree desert soil and litter or beach litter (Norton & Dindal 1976), but are impoverished in comparison to saltmarsh systems (Luxton 1967).

Lack of difference in the proportion of different feeding types in the microarthropod community between summer and winter (Fig. 3) suggests a lack of seasonality in the resource base. In deciduous forests, a "pulse" of decomposition is associated with autumn leaf fall, and soil mite populations usually peak at this time. At the Jekyll Island dune site, the surrounding vegetation is primarily non-deciduous, and the litter layer did not change markedly over the year. The soil microarthropod community maintained a ratio of approximately 75 primary consumers to 25 predators. This may represent an optimal relationship in the soil subsystem of this physically stressed habitat.

The ratio of Cryptostigmata: Prostigmata followed the pattern described by Loots & Ryke (1967), whereby the ratio was low in soil with low organic matter content, and increased in soil high in organic matter content (Table 4). This trend is mainly attributed to increased pore volume of soils high in organic matter, thus making them more accessible to the larger Cryptostigmata. However, the ratios obtained from the sand dune site were much greater than the ratios obtained from pasture soils (Loots & Ryke 1966), and ratio values were in the range reported by Van den Berg (1965, cited in Loots & Ryke 1967) found in forest soils where the organic matter content was enormously higher than the Jekyll Island dune site (Table 4). This high ratio in dune soils with relatively low organic matter content cannot be attributed to organic matter pore space alone, since soils of coastal dunes contain large pore spaces owing to the relatively large size of the sand particles comprising this soil system.

The large Cryptostigmata abundance could possibly be explained by their feeding preference for dead and decaying organic matter which is distributed and concentrated in pockets across the dune habitat.

Clearly, the soils of the coastal dunes at Jekyll Island contains a diverse and abundant fauna. The importance of microarthropods in regulating organic decomposition and nutrient flow through the plant-soil subsystem suggests that diverse and abundant microarthropod community on coastal dunes should not be overlooked. Further investigations are needed, which should address the specific role of this fauna in dune maintenance stabilization.

6. Zusammenfassung

Struktur der Mikro-Arthropoden-Gemeinschaft in einem Dünen-Ökosystem an der Küste von Jekyll Island, Georgia, U.S.A.

Proben von Kleinarthropoden wurden vier Mal auf einer Sanddüne am Strand von Jekyll Island, Georgia, entnommen. Insgesamt wurden 6398 Individuen gesammelt, die 120 Gattungen und 80 Familien zugeordnet werden konnten. Das Gesamtmaterial bestand zu 86—94% aus Milben. Collembolen stellten 4 bis 7% des Materials dar, der Rest bestand aus verschiedenen anderen Arthropoden Cryptostigmata dominierten die Fauna zahlenmäßig wie auch taxonomisch, da sie 60 bis 74% darstellen und 49 Gattungen enthielten. Prostigmata machten 12 bis 27% der Kleinarthropoden aus, mit 38 Gattungen: danach folgten Mesostigmata (4—7%, 20 Gattungen) und Coliembolen (1—8%, 13 Gattungen). Funktionelle Gruppen waren auf folgende Weise verteilt: 54—78% Primärkonsumenten, 10—25% Saprophage und 12—26% waren Räuber.

7. Acknowledgements

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Synopsis: *Original scientific paper*

Mallow, D., D. Ludwig & D. A. Crossley, Jr., 1984. Microarthropod community structure in a coastel dune ecosystem on Iekyll Island, Georgia USA. Pedobiologia **27**, 365—376.

Microarthropods were sampled from a coastal sand dune on Jekyll Island, Georgia on four occasions. A total of 6,398 microarthropods representing 120 genera in 80 families were collected. Acarina comprised between 86 and 94% of the total fauna over all sample dates. Collembola comprised 4 to 7% of the total fauna, with the remainder partitioned among miscellaneous arthropod taxa. The Cryptostigmata dominated the microarthropod fauna both numericallyand taxonomically comprising 60—74% of the total fauna, with 49 genera. The Prostigmata comprised between 12—27% of the microarthropod fauna with 38 genera, followed by the Mesostigmata and Collembola (4—7%, 20 genera and 1—8%, 13 genera respectively). Functional trophic groups were partitioned as follows: 54—78% were grazers, 10—25% were detritivores and 12—26% were predatory.

Key words: Microarthropods, sand dune, Acarina, Collembola.

Appendix

Cryptostigmata

- Astegistidae
  - *Cultroribula* sp.
- Belbodamaeidae
  - *Lanibelba pini* Norton, 1979
- Brachychthoniidae
  - *Liochthonius* sp.
  - *Brachychthonius* sp.
- Caleremaeidae
  - *Caleremaeus retractus* Banks, 1947
- Carabodidae
  - *Carabodes niger* Banks , 1895
- Ceratozetidae
  - *Ceratozetes* sp.
  - *Trichoribates* sp.
- Cosmochthoniidae
  - *Cosmochthonius* sp.
- Ctenacaridae
  - *Ctenacarus araneola* (Grandjean, 1932)
- Cymbaeremeidae
  - *Scapheremaeus* sp.
- Damaeidae
  - *Damaeus grossmani* (Wilson, 1936)
- Damaeolidae
  - *Fosseremus americanus* (Jacot 1938,)
- Epilohmanniidae
  - *Epilohmannoides* sp.
- Eremaeozetidae
  - *Eremaeozetes* sp.
- Eremobelbidae
  - *Eremobelba leporoides* Jacot, 1938
- Euphthiracaridae
  - *Rhysotritia ardua* (C. L. Koch, 1841)
  - *Microtritia minima* (Berlese, 1904)
- Galumnidae
  - *Holokalumma coloradensis* Jacot, 1929
  - *Acrogalumna* sp.
  - *Pergalumna curva* (Ewing, 1907)
- Gymnodamaeidae
  - *Allodamaeus* sp.
  - *Jacotella* sp.
- Haplozetidae
  - *Peloribates floridensis* Nevin, 1975
  - *Peloribates* sp.
  - *Rostrozetes* sp.
  - *Xylobates* sp.
- Hypochthoniidae
  - *Eohypochthonius* sp.
- Liceremaeidae
  - *Licneremaeus* sp.
- Lohmaniidae
  - *Mixacarus brevipes* (Banks, 1947)
- Microzetidae
  - *Berlesezetes* sp.
- Mochlozetidae
  - *Mochloribatula* sp.
- Nanhermanniidae
  - *Masthermannia* sp.
- Nehypochthoniidae
  - *Nehypochthonius porosus* Norton, 1980
- Nothridae
  - *Nothrus terminalis carolinae* Jacot, 1936
- Oppiidae
  - *Oppia* spp.
  - *Ramusella* sp.
  - *Oppiella* sp.
- Oribatulidae
  - *Scheloribates* sp.
  - *Dometorina* sp.
  - *Zygoribatula* sp.
  - *Oribatula* sp.
- Oripodidae
  - *Oripoda* sp.
- Parhypochthoniidae
  - *Parhypochthonius aphidinus* Berlese, 1904
- Pelopidae
  - *Eupelops* sp.
- Phthiracaridae
  - *Hoplophorella variana* Jacot, 1933
  - *Hoplophorella cucullata* Jacot, 1933
- Sphaerochthoniidae
  - *Sphaerochthonius* sp.
- Suctobelbidae
  - *Suctobelbella* sp.
- Tectocepheidae
  - *Tectocepheus velatus* (Michael, 1880)
- Trhypochthoniidae
  - *Trypochthonius silvestris* Jacot, 1937

Prostigmata

- Adamystidae
  - *Adamystis* sp.
- Alicorhagiidae
  - *Alicorhagia* sp.
- Alicidae
  - *Bimichaelia* sp.
- Anystidae
  - Gen. sp.
- Bdellidae
  - *Bdella* sp.
  - *Spinibdella* sp.
  - *Cyta* sp.
- Calligonellidae
  - *Calligonella* sp.
  - *Molothrognathus* sp.
- Camerobiidae
  - *Neophyllobius* sp.

- Cheyletidae
  - *Cheletomimus* sp.
- Cryptognathidae
  - *Cryptognathus* sp.
- Cunaxidae
  - *Cunaxa* sp.
  - *Neocunaxoides* sp.
- Erythraeidae
  - Gen. sp.
- Eupodidae
  - *Eupodes* sp.
  - *Cocceupodes* sp.
  - *Claveupodes* sp.
- Lordalycidae
  - *Hybalicus* sp.
- Nanorchestidae
  - *Nanorchestes* sp.
  - *Speleorchestes* sp.
- Paratydeidae
  - *Neotydeus* sp.
- Pygmephoridae
  - Gen. sp.
- Rhagidiidae
  - *Rhagidia* sp.
  - *Coccorhagidia* sp.
- Scutacaridae
  - *Scutacarus* sp.
- Smaridae
  - *Fessonia* sp.
- Stigmaeidae
  - *Stigmaeus* sp.
  - *Eustigmaeus* sp.
- Tarsonemiae
  - *Tarsonemidae* sp.
- Terpnacaridae
  - *Terpnacarus* sp.
  - *Sebia* sp.
- Trombiculidae
  - *Trombicula splendens*
- Trombidiidae
  - *Trombidiidae* sp.
- Tydeidae
  - *Lorryia* sp.
  - *Ricketydeus* sp.

Mesostigmata

- Ameroseiidae
  - *Ameroseius* sp.
- Ascidae
  - *Asca* sp.
  - *Cheiroseius* sp.
  - *Gamasellodes* sp.
  - Misc. Ascid. I
  - Misc. Ascid. II
- Laelapidae
  - *Hypoaspis* sp.
  - *Gaeolaspis* sp.
  - *Cosmolaelaps* sp.
  - *Pseudoparasitus* sp.
- Macrochelidae
  - *Geholaspis* sp.
- Parholaspidae
  - *Neoparholaspulus* sp.
- Parasitidae
  - *Vulgarogamasus* sp.
- Phytoseiidae
  - *Amblyseius* sp.
- Podocinidae
  - *Podocinus* sp.
- Polyaspidae
  - *Polyaspis* sp.
- Rhodacaridae
  - *Rhodacarus* sp.
- Uropodidae
  - *Discourella* sp.
  - *Uroseius* sp.

Collembola

- Hypogasturidae
  - *Brachystomella* sp.
  - *Neanura* sp.
  - *Xenylla* sp.
  - *Morulina* sp.
- Onychiuridae
  - *Tullbergia* sp.
- Isotomidae
  - *Isotoma* sp.
  - *Cryptopygus* sp.
- Entomobryidae
  - *Entomobrya* sp.
  - *Lepidocyrtus* sp.
  - *Orchesella* sp.
  - *Seira* sp.
- Neelidae
  - *Neelus* sp.
- Sminthuridae
  - *Katianniana* sp.

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